

Exercise 10.2A Fluency and skills

- 1 Given that $X \sim B(5, 0.3)$, find
 - a $P(X = 3)$ b $P(X \leq 2)$ c $P(X \neq 0)$
- 2 $X \sim B(8, 0.6)$. Find, to 2 sf
 - a $P(X \leq 0)$ b $P(X \leq 3)$
 - c $P(X < 5)$ d $P(X > 2)$
- 3 The random variable T has a binomial distribution, $n = 8$, $p = \frac{1}{4}$. Find, to 2 sf
 - a $P(T = 4)$ b $P(T \geq 7)$ c $P(3 \leq T < 3)$
- 4 Given that $X \sim B(5, 0.4)$
 - a Write an expression for $P(X = x)$
 - b Copy and complete the probability distribution table.

x	0	1	2	3	4	5
$P(X = x)$	0.078			0.250	0.377	0.010

- 5 A fair six-sided dice is thrown 4 times and the random variable X denotes the number of 6's obtained.
 - a Give the distribution of X
 - b Find, giving your answers to 3 dp
 - i $P(X = 4)$ ii $P(X > 2)$ iii $P(1 \leq X < 3)$
- 6 A bag contains 12 counters. Three are red and the rest are black. A sample of five counters is taken, placing each back in the bag after it is chosen. Find the probability that the sample contains more than 3 red counters.

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1a $P(X = 3) = 0.132$

1b $P(X \leq 2) = 0.437$

1c $P(X \neq 0) = 1 - P(X = 0) = 0.4032$

2a 0.408256

2b 0.17

2c $P(x < 5) = P(x \leq 4)$
 $= 0.41$

2d $P(x > 2) = 1 - P(x \leq 2)$
 $= 0.55$

2e $P(T = 4) = 0.0007$

3b $P(T \geq 7) = P(T = 7) + P(T = 8)$
 $= 0.000008$

3c $P(3 \leq T < 5) = P(T = 3) + P(T = 4)$
 $= 0.29$

4a $P(X = x) = {}^5C_x \times 0.2^x \times 0.8^{5-x}$

4b

x	0	1	2	3	4	5
$P(X = x)$	0.075	0.259	0.346	0.258	0.077	0.000

5a $X \sim B\left(4, \frac{1}{6}\right)$

5b i $P(X = 4) = 0.0001$

ii $P(X > 3) = 1 - P(X \leq 3)$
 $= 0.006$

iii $P(1 \leq X < 3) = P(X = 1) + P(X = 2)$
 $= 0.502$

6 Let X be the number of red counters in the sample

$X \sim B\left(5, \frac{1}{4}\right)$

$P(X > 3) = 0.01465 + 0.00080$
 $= 0.015 \text{ (3 d.p.)}$